

## PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

## Improvements in or relating to Tools for Applying Rotary Force

I, WILLIAM MAWSON HALLIDAY, of 32, Halsall Road, Birkdale, in the County of Lancaster, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention concerns intermittently acting tools for applying rotary force. It is applicable to all tools of the type where a handle is adapted to be partially rotated or translated so as to give driving effect to a member mounted rotatably with respect to said handle in one direction of motion only.

Tools of the above type such as carpenters braces, engineers wrenches and certain types of screwing stocks normally incorporate a ratchet mechanism.

An object of the present invention is to provide a simpler means for uni-directional transmission of force from the handle to the rotary member and to render the rotary member interchangeable.

According to the present invention an intermittently acting tool for applying rotary force of the type in which engagement between a rotary member and a driving handle therefor is effected by wedge and groove means, which engagement locks the rotary member and the driving handle positively within a housing for the rotary member when the handle is actuated in one direction, including means for limitation of free rocking movement between the driving handle and the housing, said means for limitation being adapted to yield when the driving handle and the housing are forcibly moved relatively to one another in the opposite direction, causing the wedge and groove means to be entirely disengaged so that the rotatable member may be withdrawn from the

housing, thus giving practically instantaneous interchangeability of a number of rotary members.

A tool may conveniently and more specifically comprise a housing, a handle rotatably connected to said housing, a rotary member carried within said housing, complementary wedge and groove means on or associated with said handle and said rotary member and operable by relative movement therebetween, said wedge and groove means serving at all positions of the limited rocking movement between the handle and the housing to locate the rotary member against free axial displacement.

The means for limitation may consist of a spring secured to the handle and resiliently bearing on a surface of the housing, which when the handle and the housing are moved forcibly relative to one another in one direction is caused to move on to a second surface in which position axial location of the rotary member no longer exists, enabling said member to be completely withdrawn from the housing.

The invention will be described further by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a fragmentary plan, partially in horizontal section, showing a preferred form of hexagon socket wrench;

Fig. 2 is a side elevation, partially in section, of the wrench shown in Fig. 1;

Fig. 3 is a fragmentary plan, partially in horizontal section, showing the handle and housing for a rotary member in a further form of socket wrench;

Fig. 4 shows in side elevation, partially in section, a further form of socket wrench;

Fig. 5 is a fragmentary plan, partially in horizontal section, showing the inter-

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relationship between the handle and the rotary member in the wrench of Fig. 4; and

Fig. 6 is a detail in plan of a modified rotary member.

A hexagon socket wrench (Figs. 1 and 2) comprises a handle 11 pivoted on a pin 12 to a housing 13 for a rotary member 14. A T-shaped leaf spring 15 is attached at 16 to the handle.

That end of the handle nearest to the pin 12 is formed as a wedge. It includes an end portion 11a having bevelled upper and lower faces and a contour diverging by a small angle from the normal to the axis of the handle. The housing 13 is bored at 13a to receive as a rotatable fit therein the rotary member 14. The housing 13 is of generally cylindrical external shape except for a split lug 13b. The two limbs of this lug carry the pin 12 and are spaced apart by a distance equal to the thickness of the handle 11. The rotary member 14 is externally cylindrical and provided with a peripheral groove 14a. The sides of this groove are inclined by a few degrees from the normal to the groove base which is cylindrical, so as to give a groove profile which is complementary to the profile of the end portion 11a of the handle. The member 14 also has a hexagonal aperture 14b.

In operation, if the handle is caused to move in a direction as indicated by the arrow in Fig. 1 it swivels on the pin 12 relative to the housing 13 so that the portion 11a becomes disengaged from the peripheral groove in the member 14. The amount of swivelling on the pin 12 is small and only need be sufficient to effect disengagement between the portion 11a and the groove 14a. Limitation of this swivelling movement is effected by abutment of the spring 15 on the edge of the split lug 13b of the housing so that continued rotation of the handle then causes the housing to move in a counter clockwise direction as seen in Fig. 1.

Assuming that the rotary member has its hexagonal socket engaged on the hexagon head of a bolt or on a hexagon nut, such bolt or nut would hold the member 14 substantially stationary.

If, on the other hand, the handle 11 is moved in a direction opposite to that indicated by the curved arrow, the wedge portion 11a of the handle is swung into engagement with the groove 14a so that the handle housing and member are simultaneously moved in a clockwise direction. If the hexagon head engaged in the socket 14b offers considerable resistance to motion, the complementary wedge and groove means will then be more fully interengaged.

This construction is particularly advantageous since the wedge portion 11a of the handle acts as an axial locating means for the member 14 in the housing 13. The invention makes it practical to provide a set of alternative rotary members for use in each wrench. For instance, a plurality of members may have differently sized hexagon sockets or certain members of the set may have sockets of other shapes or can be provided with projections or spindles for transmitting the rotary force to other types of tool or workpiece.

In order to change the member 14, the housing is gripped firmly in one hand whilst the handle is moved forcibly in the direction of the arrow (Fig. 1) by the use of the other hand so that the spring yields so as to bend clear of the edge of the split lug 13b. By this means, the handle may be swung in the direction of the arrow through a substantial angle thereby allowing the rotary member to be freely displaceable in an axial direction in the bore 13a.

The dependence of the force of engagement of the wedge and groove means upon the force applied to the handle is avoided by the provision of a suitable stop. Such a stop may take the form of a set screw (Fig. 3) engaged in a bridge 21 extending across the limbs of the lug 13b of the housing.

It is by no means essential to associate the wedge with the handle and the groove with the rotary member. A rib on the rotary member may conveniently operate with a groove in the end portion of the handle.

A wrench incorporating double wedging action (Figs. 4 and 5) may include a wedge in the form of a ball 22 acting between the groove 14a in the rotary member and a complementary groove in the end portion of the handle.

In certain cases it may be found that insufficient gripping action is obtained and improved gripping effect may be derived from the use of a rotary member in which the groove or wedge means thereon is formed as a discontinuous surface comprising a plurality of relatively short, straight lengths to give a more positive wedging effect, thus, for instance, the base of the groove means in a rotary member would have in sectional view a polygonal form (Fig. 6).

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An intermittently acting tool for applying rotary force of the type in which engagement between a rotary

member and a driving handle therefor is effected by wedge and groove means, which engagement locks the rotary member and the driving handle positively within a housing for the rotary member when the handle is actuated in one direction, including means for limitation of free rocking movement between the driving handle and the housing, said means for limitation being adapted to yield when the driving handle and the housing are forcibly moved relatively to one another in the opposite direction, causing the wedge and groove means to be entirely disengaged so that the rotatable member may be withdrawn from the housing, thus giving practically instantaneous interchangeability of a number of rotary members.

2. A tool as claimed in claim 1 comprising a housing, a handle rotatably connected to said housing, a rotary member carried within said housing, complementary wedge and groove means on or associated with said handle and said rotary member and operable by relative movement therebetween, said wedge and groove means serving at all positions of the limited rocking movement between the handle and the housing to locate the rotary member against free axial displacement.

3. A tool as claimed in claim 1 or 2 in which said means for limitation consists of a spring secured to the handle and resiliently bearing on a surface of the housing.

4. A tool as claimed in claim 3 in which when the handle and housing are moved forcibly relatively to one another in said opposite direction the spring is caused to move onto a second surface of the housing in which position the axial location of the rotary member no longer exists enabling said member to be completely withdrawn from the housing.

5. A tool as claimed in any of the pre-

ceding claims in which a groove extends peripherally on the rotary member, the handle carrying or presenting a wedge adapted to engage such groove when the handle is moved in one direction but to be released when the handle is moved in the opposite direction.

6. A tool as claimed in any of claims 1 to 4 in which a peripherally extending rib constituting a wedge is formed on the rotary member, the handle having a groove therein adapted to engage such wedge when the handle is moved in one direction but to be released when the handle is moved in the opposite direction.

7. A tool as claimed in any of claims 1 to 4 employing a double wedging action in which a wedge is engageable between grooves associated with the handle and the rotary member respectively.

8. A tool as claimed in claim 7 in which said wedge is constituted by a ball.

9. A tool as claimed in any of claims 5 to 8 in which a stop is provided to limit wedging action.

10. A tool as claimed in any of the preceding claims in which the groove or wedge means on the rotary member is formed as a discontinuous surface comprising a plurality of relatively short, straight lengths to give a more positive wedging effect.

11. A tool as particularly described with reference to Figs. 1 and 2 of the accompanying drawings.

12. A tool as particularly described with reference to Fig. 3 of the accompanying drawings.

13. A tool as particularly described with reference to Figs. 4 and 5 of the accompanying drawings.

Dated this 23rd day of February, 1949.

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*This Drawing is a reproduction of the Original on a reduced scale*

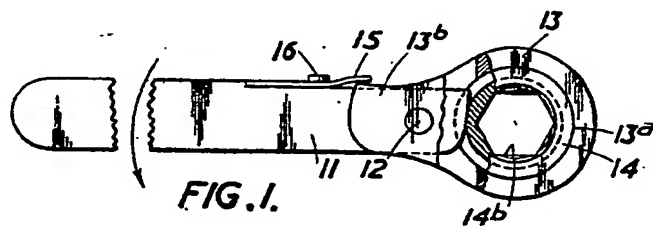


FIG. 1.

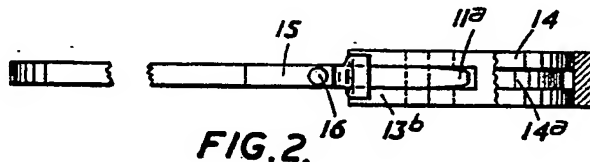


FIG. 2.

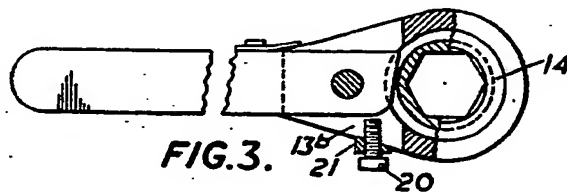


FIG. 3.

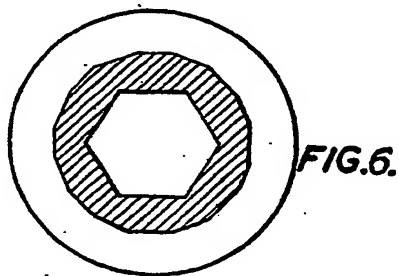


FIG. 6.

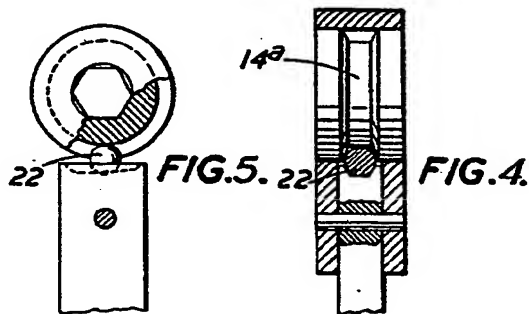


FIG. 5.

FIG. 4.

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